CEQA

AIR QUALITY HANDBOOK

A GUIDE FOR ASSESSING THE AIR QUALITY IMPACTS FOR PROJECTS SUBJECT TO CEQA REVIEW

April 2003

AIR POLLUTION CONTROL DISTRICT
COUNTY OF SAN LUIS OBISPO

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List of Acronyms

ACM	Asbestos Containing Material
ADT	Average Daily Trips
APCD	San Luis Obispo County Air Pollution Control District
ARB	California Air Resources Board
ATCM	Air Toxics Control Measure
CAAA	1990 Clean Air Act Amendments
CAP	Clean Air Plan for San Luis Obispo County
CBACT	Best Available Control Technology for Construction Equipment
CDPF	Catalyzed Diesel Particulate Filter
CEQA	California Environmental Quality Act
CNG	Compressed Natural Gas
CO	Carbon Monoxide
DOC	Diesel Oxidation Catalyst
EIR	Environmental Impact Report
EPA	United States Environmental Protection Agency
H2S	Hydrogen Sulfide
ITE	Institute of Transportation Engineers
LNG	Liquid Natural Gas
LOS	Level of Service
OCS	Outer Continental Shelf
NESHAP	National Emission Standard for Hazardous Air Pollutants
NOP	Notice of Preparation
NOx	Oxides of Nitrogen
PM10	Particulate Matter (less than 10 μm)
ROG	Reactive Organic Gases
SLO	San Luis Obispo
SO2	Sulfur Dioxide
TDM	Transportation Demand Management
VMT	Vehicle Miles Traveled

CEQA
Air Quality Handbook

GUIDE FOR ASSESSING THE AIR QUALITY IMPACTS FOR PROJECTS SUBJECT TO CEQA REVIEW

The purpose of this document is to assist lead agencies, planning consultants, and project proponents in assessing the potential air quality impacts from residential, commercial and industrial development. It was designed to provide uniform procedures for preparing the air quality analysis section of environmental documents for projects subject to the California Environmental Quality Act (CEQA). These guidelines define the criteria used by the San Luis Obispo County Air Pollution Control District (APCD or District) to determine when an air quality analysis is necessary, the type of analysis that should be performed, the significance of the impacts predicted by the analysis, and the mitigation measures needed to reduce the overall air quality impacts. It is hoped that use of this document will simplify the process of evaluating and mitigating the potential air quality impacts from new development in San Luis Obispo County.

For further information on any of the topics covered in this handbook, review the District's website at www.slocleanair.org or contact us directly at (805) 781-5912.

1 PROJECTS REQUIRING AIR QUALITY REVIEW AND ANALYSIS

The APCD has permit authority over many "direct" sources of air contaminants, such as power plants, gasoline stations, dry cleaners and refineries. The District does not, however, exercise permit authority over "indirect" emission sources. Indirect sources are facilities and land uses which do not emit a significant amount of pollution themselves, but attract or generate motor vehicle trips which results in emissions of ozone precursors and fine particulate matter. Emissions from these sources are typically addressed through the land use planning process under the guidelines and statutes of CEQA.

1.1 Role of the District

The District normally acts as a **responsible or commenting agency** under CEQA, reviewing and commenting on projects which have the potential to cause adverse impacts to air quality. Under CEQA statutes and guidelines lead agencies are required to seek comments from each responsible agency and any pubic agency that has jurisdiction by law over resources that may be affected by a proposed project (CEQA 21153 and 15366). For most urban development proposals, this typically involves projects where vehicle trip generation is high enough to cause emission levels capable of hindering the District's efforts to attain and maintain the state health-based air quality standards. It is in this context that local jurisdictions and planning bodies can make critical decisions that affect their future environment, and that of neighboring communities as well.

Offshore activities such as harbor dredging and cable installation will also be subject to CEQA review and possible permitting through the district depending on the nature of the activity.

1.2 Projects Subject to Air Quality Analysis

In general, any proposed project which has the potential to emit **10 lbs/day or more** of reactive organic gases (ROG), oxides of nitrogen (NOx), sulfur dioxide (SO2), or particulate matter (PM10), or **50 lbs/day or more** of carbon monoxide (CO) should be submitted to the District for review. The project will be evaluated to determine the potential for significant air quality impacts, with further analysis or mitigation recommended if appropriate. Types of projects which generally fall into this category include: Tract Maps, Development Plans, Site Plans, Area Plans, Specific Plans, Local Coastal Plans, General Plan Updates and Amendments, large residential developments and large commercial or industrial developments. Environmental documents associated with these types of projects are also reviewed by the District. Initial Studies, Notices of Preparation (NOP), Negative Declarations, and Environmental Impact Reports (EIR) are examples of documents requiring District review.

1.3 Project Information Needed for District Review

Early consultation with the District can ensure that the environmental document adequately addresses air quality issues. In order to facilitate our review of the proposed project, the following information should be provided:

- Complete and accurate project description, including all estimates and assumptions;
- Environmental documents, including Draft EIRs, Initial Studies, Negative Declarations, etc.;
- Any technical documents or appendices that relate to air quality, including traffic analyses, growth impact projections, land use elements, maps, etc.; and,
- Mitigation Monitoring Program, if applicable.

1.4 Screening Criteria for Project Impacts

General screening criteria used by the District to determine the type and scope of projects requiring an air quality assessment, and/or mitigation, are presented in Table 1-1. These criteria are based on project size and are focused primarily on the indirect emissions (i.e., motor vehicles) associated with residential, commercial and industrial development. The list is not comprehensive and should be used for general guidance only. A more refined analysis of air quality impacts specific to a given project, such as the use of the URBEMIS model, is often necessary for projects exceeding the screening thresholds.

Table 1-1 Screening Criteria for Project Air Quality Impacts

LAND USE	UNIT OF MEASURE	TRIP GENERATION RATE [1]		PROJECT SIZE WHICH WOULD GENERATE:	
		Weekday	Weekend	10 lbs/day of Emissions [2]	25 lbs/day of Emissions [2]
RESIDENTIAL:					
Single Family	Dwelling unit	10.0	10.0	35	85
Apartments	Dwelling unit	6.5	6.5	50	125
Condominiums (High Rise)	Dwelling unit	4.2	4.3	60	150
Condominiums (Family)	Dwelling unit	5.7	6.5	50	150
Mobile Home Park	Dwelling unit	4.8	5.0	55	135
RETAIL:					
Shopping Center					
10,000 - 50,000 sq. ft.	1000 sq. ft.	167.6	215.4	ANY RETAIL FACILITY WITH GREATER THAN 3,000 SQ. FT. SHOULD BE SENT TO THE DISTRICT FOR REVIEW	
50,000 - 100,000 sq. ft.	1000 sq. ft.	91.7	118.4		
100,000 - 200,000 sq. ft.	1000 sq. ft.	70.7	91.5		
200,000 - 300,000 sq. ft.	1000 sq. ft.	54.5	70.7		
300,000 - 400,000 sq. ft.	1000 sq. ft.	46.8	60.8		
400,000 - 500,000 sq. ft.	1000 sq. ft.	42.0	54.6		
500,000 - 600,000 sq. ft.	1000 sq. ft.	38.7	50.3		
600,000 - 800,000 sq. ft.	1000 sq. ft.	36.4	47.0		
800,000 - 1,000,000 sq. ft	1000 sq. ft.	33.9	42.2		
1,000,000- 1,200,000 sq.ft.	1000 sq. ft.	32.1	38.8		
Discount Store	1000 sq. ft.	70.1	72.7	7,600 sq. ft.	19,000 sq. ft.
Convenience Market	1000 sq. ft	738.0	863. 1	820 sq. ft.	2,000 sq. ft.
INDUSTRIAL:					
Light Industrial	1000 sq. ft.	7.0	1.3	72,000 sq. ft.	180,000 sq. ft.
Light Industrial	acres	51.8	8.7	9.8 acres	25 acres
Industrial Park	1000 sq. ft.	7.0	2.5	77,000 sq. ft.	190,000 sq. ft.
Industrial Park	acres	62.9	34.2	8.5 acres	21 acres
Manufacturing	1000 sq. ft	3.9	1.5	110,000sq. ft.	280,000 sq. ft.
Manufacturing	acres	38.9	33.4	11 acres	28 acres
Heavy Industrial	1000 sq. ft.	1.5		140,000 sq. ft.	350,000 sq. ft.
Heavy Industrial	acres	65.3		3.3 acres	8.3 acres
OFFICE:					
Medical Office	1000 sq. ft.	34.2	9.0	20,000 sq. ft.	50,000 sq. ft.
Medical Office	Employee	8.8	4.0	77 Employees	190 Employees
Office Park	1000 sq. ft.	11.4	1.6	45,000 sq. ft.	110,000 sq. ft.
Office Park	Employees	3.5	0.6	150 Employee	370 Employees
Office Park	Acres	195.1	29.3	2.6 acre	6.5 acres

Table 1-1 Screening Criteria for Project Air Quality Impacts (Cont'd.)

LAND USE	UNIT OF MEASURE	TRIP GENERATION RATE (ADT)		PROJECT SIZE WHICH WOULD GENERATE:	
		Weekday	Weekend	10 lbs/day of Emissions[2]	25 lbs/day of Emissions[2]
RESTAURANT USES:					
Quality Restaurant	1000 sq. ft.	96.5	92.6	7,000 sq. ft.	18,000 sq. ft.
Fast Food with Drive-Up	1000 sq. ft.	632.1	686.0	1,000 sq. ft.	2,500 sq. ft.
Fast Food without Drive-Up	1000 sq. ft.	786.2	822.8	840 sq. ft.	2,100 sq. ft.
Sit Down	1000 sq. ft.	205.4	229.3	3,000 sq. ft.	7,500 sq. ft.
EDUCATION: [3]					
Elementary School	1000 sq. ft.	10.7		58,000 sq. ft.	140,000 sq. ft.
Elementary School	No. Employees	13.4		46 Employees	110 Employees
Elementary School	No. Students	1.1		560 Students	1400 Students
High School	1000 sq. ft.	10.9		61,000 sq. ft.	150,000 sq. ft.
High School	No. Employees	16.8		39 Employees	99 Employees
High School	No. Students	1.4	0.8	470 Employees	1200 Employees
Day Care Center	1000 sq. ft.	79.3	6.2	8600 sq. ft.	22,000 sq. ft.
Day Care Center	No. Employees	33.2		21 Employees	52 Employees
FINANCIAL:					
Walk-In Bank	No. Employees	67.4	18.6	10 Employees	25 Employees
Walk-In Bank	1000 sq. ft.	140.6	38.9	4,800 sq. ft.	12,000 sq. ft.
Drive-In Bank	No. Employees	72.8	17.8	9 Employees	23 Employees
Drive -In Bank	1000 sq. ft.	265.2	65.9	2,600 sq. ft.	6,500 sq. ft.
MISCELLANEOUS:					
Hospital	1000 sq. ft.	16.8		36,000 sq. ft.	90,000 sq. ft.
Hospital	No. Employees	5.2		110 Employees	290 Employees
Hotel	No. Rooms	8.7	10.5	66 Rooms	160 Rooms
Hotel	No. Employees	12.3	14.3	48 Employees	120 Employees
Resort Hotel	No. Rooms	10.2	10.2	67 Rooms	160 Rooms
Resort Hotel	No. Employees	13.8	10.3	50 Employees	120 Employees

1. Trip generation rates in this table are from the Institute of Transportation Engineers (ITE) Trip Generation Rate Tables. Weekend rates reflect the reasonable worst-case for either Saturday or Sunday.
2. Emissions are defined as one of either ROG, NOx or PM10.
3. All projects involving the purchase of a school site, or construction of a new elementary or secondary school must be referred to the District for review and comment. (California Public Resources Code Section 21151.8, Subd. (a)(2)).

Data in this table was generated using URBEMIS7G. This table will be updated after EMFAC 2002 emission factors are incorporated into the URBEMIS model.

2 SIGNIFICANCE CRITERIA

The District has established four separate categories of evaluation for determining the significance of project impacts. Full disclosure of the potential air pollutant and/or toxic air emissions from a project is needed for these evaluations, as required by CEQA:

1) Comparison of calculated project emissions to District emission thresholds;

2) Consistency with the most recent Clean Air Plan (CAP) for San Luis Obispo County;

3) Comparison of predicted ambient pollutant concentrations resulting from the project to state and federal health standards, when applicable; and

4) The evaluation of special conditions which apply to certain projects.

2.1 Comparison To APCD Emission Thresholds

The threshold criteria established by the District to determine the significance and appropriate mitigation level for long-term emissions from a project are presented in Table 2-1. Emissions which equal or exceed the designated threshold levels are considered potentially significant and should be mitigated. As shown in the table, the level of analysis and mitigation recommended follows a tiered approach based on the overall amount of emissions generated by the project.

A Program Level environmental review, such as for a General Plan, Specific Plan or Area Plan however, does not require a quantitative air emissions analysis at the project scale. A qualitative analysis of the air quality impacts should be conducted instead, and should be generated for each of the proposed alternatives to be considered. The qualitative analysis of each alternative should be based upon criteria such as prevention of urban sprawl and reduced dependence on automobiles. A finding of significant impacts can be determined qualitatively by comparing consistency of the project with the Transportation and Land Use Planning Strategies outlined in the District's Clean Air Plan. Refer to Section 2.2 for more information.

Section 5 of this document provides guidance on the type of mitigation recommended for varying levels of impact and presents a sample list of appropriate mitigation measures for different types of projects. Most of the mitigation strategies suggested focus on methods to reduce vehicle trips and travel distance, including site design standards which encourage pedestrian and bicycle-friendly, transit-oriented development. In addition, the recommendations include design strategies for residential and commercial buildings that address energy conservation and other concepts to reduce total project emissions. These recommendations are not all inclusive and are provided as examples among many possibilities.

Short-term emissions from project construction or other temporary activities should also be evaluated and mitigated when necessary. Guidelines for analysis, determination of impact significance for construction activities, and mitigation measures are presented in Section 6.

Table 2-1 provides general guidelines for determining the significance of impacts and type of environmental analysis recommended in relation to total emissions expected from project

operations. The discussion following the table gives a more detailed explanation of the thresholds.

Table 2-1 Thresholds of Significance for Operational Emissions Impacts

Pollutant		Tier 1	Tier 2	Tier 3
ROG, NOx, SO_2, PM_{10}	< 10 lbs/day	10 lbs/day	25 lbs/day	25 tons/yr.
CO	< 550 lbs/day		550 lbs/day	
Significance	Insignificant	Potentially Significant Impacts	Significant Impacts	Significant Impacts
Environmental Document	Negative Declaration (ND)	Mitigated ND	Mitigated ND or EIR	EIR

Less than 10 lbs/day of ROG, NOx, SO_2, PM10 or less than 550 lbs/day for CO
There are no significant air quality impacts associated with the project. Thus, mitigation measures are not required; any development strategies found in Sections 5 and 6 that are integrated into the project would be considered a project benefit. A NEGATIVE DECLARATION should be prepared.

Tier 1: 10 - 24 lbs/day of ROG, NOx, SO_2, PM10
Any project which has the potential to exceed the Tier 1 threshold has the potential to cause significant air quality impacts, and should be submitted to the District for review. On-site mitigation measures, following the guidelines in Section 5, are recommended to reduce air quality impacts to a level of insignificance. A MITIGATED NEGATIVE DECLARATION should be prepared.

Tier 2: greater than or equal to 25 lbs/day or more of ROG, NOx, SO_2, PM10 or greater than or equal to 550 lbs/day of CO
If all feasible mitigation measures are incorporated into the project and emissions can be reduced to less than the Tier 2 threshold, then a MITIGATED NEGATIVE DECLARATION may be prepared.

If all feasible mitigation measures are incorporated into the project and emissions are still greater than the Tier 2 threshold, then an ENVIRONMENTAL IMPACT REPORT should be prepared. Additional mitigation measures, including off-site mitigation, may be required depending on the level and scope of air quality impacts identified in the EIR.

For CO, emission levels equal to or exceeding 550 lbs/day should be modeled to determine their significance. Refer to Section 3.2 for additional information.

Tier 3: 25 tons/year or more of Emissions
If emissions from a project will exceed the Tier 3 threshold, then an ENVIRONMENTAL IMPACT REPORT should be prepared. Depending upon the level and scope of air quality impacts identified in the EIR, mitigation measures, including off-site mitigation measures, may be required to reduce the overall air quality impacts of the project to a level of insignificance.

2.1.1 Evaluation of Project Changes

If after final project approval the scope or project description is modified, the project will need to be re-evaluated by the District to determine if additional air impacts will result from the proposed modifications. If additional impacts are expected, the cumulative impacts from the total project must be evaluated.

2.2 Consistency with the District's Clean Air Plan

A consistency analysis with the CAP is required for a Program Level environmental review, and may be necessary for a Project Level environmental review, depending on the project being considered. Program Level environmental reviews include General Plan Updates and Amendments, Specific Plans, and Area Plans. Project Level environmental reviews which may require consistency analysis with the CAP include subdivisions, large residential developments and large commercial/industrial developments. The consistency analysis should evaluate the following questions:

1. Are the population projections used in the plan or project equal to or less than those used in the most recent CAP for the same area?
2. Is the rate of increase in vehicle trips and miles traveled less than or equal to the rate of population growth for the same area?
3. Have all applicable land use and transportation control measures and strategies from the CAP been included in the plan or project to the maximum extent feasible?

If the answer to ALL of the above questions is yes, then the proposed project or plan is considered to be consistent with the CAP. If the answer to ANY one of the questions is no, then the emissions reductions projected in the CAP may not be achieved, which could hinder our ability to achieve or maintain attainment of the state ozone standard. Inability to comply with the state ozone standard could bear potential negative economic implications for the county's residents and business community. This would be considered inconsistent with the CAP. The APCD will generally recommend denial for projects that are deemed to be inconsistent with the CAP.

2.3 Comparison to Standards

State and federal ambient air quality standards have been established to protect public health and welfare from the adverse impacts of air pollution; these standards are listed in Table 2-2. Industrial and large commercial projects are sometimes required to perform air quality dispersion modeling if the District determines that project emissions may have the potential to cause an exceedance of these standards. In such cases, gaussian models such as SCREEN or ISC3 are run to calculate the potential ground-level pollutant concentrations resulting from the project. The predicted pollutant levels are then compared to the applicable state and federal standards. A project is considered to have a significant impact if its emissions are predicted to cause or contribute to a violation of any ambient air quality standard. In situations where the predicted standard violation resulted from the application of a "screening-level" model or calculation, it may be appropriate to perform a more refined modeling analysis to accurately estimate project impacts. If a refined analysis is not available or appropriate, then the impact must be mitigated to a level of insignificance or a finding of overriding considerations must be made by the permitting agency.

Table 2-2 Ambient Air Quality Standards (State and Federal)

Pollutant		Averaging Time	California Standard - (1)	Federal Standard (2)
Ozone		1 Hour	0.09 ppm	0.12 ppm
		8 Hour		0.08 ppm
Carbon Monoxide		8 Hour	9.0 ppm	9 ppm
		1 Hour	20 ppm	35 ppm
Nitrogen Dioxide		Annual Arithmetic Mean		0.053 ppm
		1 Hour	0.25 ppm	
Sulfur Dioxide		Annual Arithmetic Mean		0.030 ppm
		24 Hour	0.04 ppm	0.14 ppm
		3 Hour		0.5 ppm (secondary)
		1 Hour	0.25 ppm	
Suspended Particulate Matter	**PM_{10}**	Annual Arithmetic Mean	20 $\mu g/m^3$ (3)	50 $\mu g/m^3$
		24 Hour	50 $\mu g/m^3$	150 $\mu g/m^3$
	$PM_{2.5}$	Annual Arithmetic Mean	12 $\mu g/m^3$ (3)	15 $\mu g/m^3$
		24 Hour		65 $\mu g/m^3$
Hydrogen Sulfide		1 Hour	0.03 ppm	
Visibility		8 Hour	In sufficient amount to reduce the prevailing visibility to less than ten miles when the relative humidity is less than 70%.	

1. State standards for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide (1-hour) and PM-10 are not to be exceeded. All other state standards are not to be equaled or exceeded.
2. Federal Primary Standards unless otherwise indicated. Federal standards are not to be exceeded more than once in any calendar year.
3. Adopted by the Air Resources Board (ARB) on June 20, 2002.

The need to perform air quality dispersion modeling for typical urban development projects is infrequent, and is determined on a case-by-case basis by the District. If such modeling is found necessary, the project consultant should check with the District to determine the appropriate model and input data to use in the analysis.

2.4 Special Conditions

Project impacts may also be considered significant if one or more of the following special conditions apply:

a. If a project has the potential to emit toxic or hazardous air pollutants, or is located in close proximity to sensitive receptors, impacts may be considered significant due to increased cancer risk for the affected population, even at a very low level of emissions. Such projects may be required to prepare a risk assessment to determine the potential level of risk associated with their operations. The District should be consulted on any project with the potential to emit toxic or hazardous air pollutants. Pursuant to the requirements of California Health and Safety Code Section 42301.6 (AB 3205) and Public Resources Code Section 21151.8, subd. (a)(2), any new school, or proposed industrial or commercial project site located within 1000 feet of a school must be referred to the District for review. Further details on requirements for projects in this category are presented in Appendix A.

b. In July of 1999 the California Air Resources Board (ARB) listed diesel particulate matter (diesel PM) emissions from diesel-fueled engines as a toxic air contaminant with no identified threshold level below which there are no significant effects. If a project will result in release of diesel emissions in areas with potential for human exposure, a finding of significance can be made, even if overall emissions are low. Factors that will be considered by APCD staff when determining significance of a project include the expected emissions from diesel equipment, location of the project and distance to sensitive receptors.

c. Remodeling and demolition activities have potential negative air quality impacts, including issues surrounding proper demolition and disposal of asbestos containing material (ACM). Asbestos can also be found in utility pipes/pipelines (transite pipes or insulation on pipes). If utility pipelines are scheduled for removal or relocation; or building(s) are removed or renovated the project may be subject to various regulatory requirements including National Emission Standard for Hazardous Air Pollutants (40CFR61, Subpart M - asbestos NESHAP). Asbestos is listed as a toxic air contaminant by both ARB and by the U.S. Environmental Protection Agency (EPA). It is discussed in these Guidelines as a separate issue because of its widespread presence in the environment, its human health implications, and its concern among the public. Asbestos is likely to be found in buildings constructed before 1979 and almost certain to be present in those built before 1950. If a project involves demolition and disposal of asbestos containing material then the project is subject to the requirements stipulated in the NESHAP, which includes but is not limited to: 1) notification requirements to the District, 2) asbestos survey conducted by a Certified Asbestos Inspector, and 3) applicable removal and disposal requirements of identified ACM.

d. Naturally occurring asbestos has been identified by the state Air Resources Board as a toxic air contaminant. Serpentine and ultramafic rocks are very common throughout California and may contain naturally occurring asbestos. The District has identified areas throughout the County where naturally occurring asbestos may be present. Under the State ARB's Air Toxic Control Measure (ATCM) for Construction, Grading, Quarrying, and Surface Mining Operations, prior to any grading activities at a project site located in the candidate area, a geologic evaluation will be necessary to determine if naturally occurring asbestos is present. If naturally occurring asbestos is found at the site the applicant must comply with all requirements outlined in the Asbestos ATCM for Construction, Grading, Quarrying, and Surface Mining Operations. These requirements may include but are not limited to: 1) an Asbestos Dust Mitigation Plan which must be approved by the District before construction begins, and 2) an Asbestos Health and Safety Program will also be required for some projects.

e. If a project is located near a sensitive receptor, such as a school, hospital or senior center, it may be considered significant even if other criteria do not apply. The health effects of a project's emissions may be more pronounced if they impact a considerable number of children, elderly, or people with compromised respiratory or cardiac conditions. Potential sensitive receptor locations should be identified in the environmental documents for APCD staff evaluation.

f. If a project has the potential to cause an odor or other nuisance problem which could impact a considerable number of people, then it may be considered significant. A project may emit a pollutant in concentrations that would not otherwise be significant except as a nuisance, for example hydrogen sulfide (H2S). Odor impacts on residential areas and other sensitive receptors warrant the closest scrutiny, but consideration should also be given to other land uses where people may congregate, such as recreational facilities, work sites and commercial areas.

When making a determination of odor significance, determine whether the project would result in an odor source located next to potential receptors within the distances indicated in Table 2.3. The Lead Agency should evaluate facilities not included in Table 2.3 or projects separated by greater distances than indicated in Table 2.3 if warranted by local conditions or special circumstances. The list is provided as a guide and, as such, is not all-inclusive.

If a project is proposed within the screening level distances in Table 2.3, the District's Enforcement Division should be contacted for information regarding potential odor problems. For projects that involve new receptors located near an existing odor source(s), an information request should be submitted to the District to review the inventory of odor complaints for the nearest odor emitting facility(ies) during the previous three years. For projects involving new receptors to be located near an existing odor source where there is currently no nearby development, and for new odor sources locating near existing receptors, the information request and analysis should be based on a review of odor complaints for similar facilities.

Table 2-3 Project Screening Distances for Potential Odor Sources	
Type of Operation	**Project Screening Distance**
Wastewater Treatment Plant	1 mile
Sanitary Landfill	1 mile
Transfer Station	1 mile
Composting Facility	1 mile
Petroleum Refinery	2 miles
Asphalt Batch Plant	1 mile
Chemical Manufacturing	1 mile
Fiberglass Manufacturing	1 mile
Painting/Coating Operations (e.g. auto body shops)	1 mile
Rendering Plant	1 mile
Coffee Roaster	1 mile
Food Processing Facility	1 mile

For a project to be located near an existing odor source, the project should be identified as having a significant odor impact if it will be located closer to an existing odor source than any location where there has been: 1) more than one confirmed complaint per year averaged over a three year period, or 2) three unconfirmed complaints per year averaged over a three year period.

If a proposed project is determined to result in potential odor problems, mitigation measures should be identified. For some projects, add-on controls or process changes, such as carbon absorption, incineration or an engineering modification to stacks/vents, can reduce odorous emissions. In many cases, however, the most effective mitigation strategy is the provision of a sufficient distance, or buffer zone, between the source and the receptor(s).

The APCD should be consulted whenever any of these special conditions apply.

3 METHODS FOR CALCULATING PROJECT EMISSIONS

Air pollutant emissions from urban development can derive from a variety of sources, including motor vehicles, wood burning appliances, natural gas and electric energy use, combustion-powered utility equipment, paints and solvents, equipment or operations used by various commercial and industrial facilities, construction and demolition equipment and operations, and various other sources. The amount and type of emissions produced, and their potential to cause significant impacts, depends on the type and level of development proposed. The following sections describe the recommended methods generally used to calculate emissions from motor vehicles, congested intersections and roadways, non-vehicular sources at residential and commercial facilities, and industrial point and area sources. Calculation and mitigation of construction emissions are described separately in Section 6.

3.1 Motor Vehicle Emissions

Motor vehicles are a primary source of long-term emissions from many residential, commercial, institutional, and industrial land uses. These land uses often do not emit significant amounts of air pollutants directly, but cause or attract motor vehicle trips that do produce emissions. Such land uses are referred to as indirect sources.

Motor vehicle emissions associated with indirect sources should be calculated for projects which exceed the screening criteria listed in Table 1-1. Calculations should be based on the most recent vehicle emission factors (EMFAC series) provided by the California Air Resources Board (ARB), and trip generation factors published by the Institute of Transportation Engineers (ITE). These factors have been incorporated into a simple computer model called URBEMIS, originally developed by the ARB. URBEMIS incorporates the EMFAC emission factors and ITE trip rates. This program is available for download from the APCD website at www.slocleanair.org/programs/download.asp.

URBEMIS is a planning tool for estimating vehicle travel, fuel use and resulting emissions related to land use projects. The model calculates emissions of ROG, CO, NOx and PM10 from vehicle use associated with new or modified development such as shopping centers, housing, commercial services and industrial land uses. URBEMIS allows users to compare motor vehicle emissions as a function of the number of vehicle trips associated with a given land use and the vehicle miles traveled for each particular type of trip taken. The calculated emissions can then be used as a basis for project screening.

User-specified inputs to the model include project type, year, season, trip speed and other parameters. Table 3-1 identifies the District's recommended changes to the default values in the program which should be used when no other project specific information is available. If different values are used, justification and documentation for the inputs should be provided.

Table 3-1 Recommended URBEMIS Default Value Changes	
Air District	San Luis Obispo County
Analysis Year	Most optimistic project completion year
Temperature - summer(1)	75º F
Average Vehicle Speed	35 mph
Trip Length	
Residential(2)	Home-based work: 13 miles
	Home-based shop: 5 miles
	Home-based other: 5 miles
Commercial(2)	Commercial-based: 13 miles
	Commercial-based non-work: 5 miles
	Commercial-based customer: 5 miles
All Other URBEMIS Inputs	Use default values, unless project-specific data is available

1. When calculating emissions for the year, use a weighted average with 2/3 of the total emissions from summer outputs and 1/3 of the total emissions from winter outputs.
2. The trip length inputs are acceptable for projects that are located either urban or rural.

The District recommends using the most recent version of URBEMIS adopted by the ARB and the corresponding version of EMFAC. A link to the most recent version of URBEMIS can be accessed from the APCD's website at www.slocleanair.org.

One deficiency in URBEMIS occurs in calculating PM10 emissions. The model only accounts for tire and brake wear, and exhaust particulate. However, the most significant source of PM10 actually comes from re-entrained road dust as vehicles travel on roadway surfaces. Thus, an additional calculation needs to be performed and the results added to the URBEMIS output. Entrained road dust PM10 emissions should be calculated using the paved and unpaved road emission factors provided in Table 3-2. The appropriate emission factor is selected by matching the anticipated vehicle fleet type and roadway type.

Table 3-2 Entrained Road Dust PM10 Emission Factors			
	Paved Roads (2)		
	ADT (1)< 5000	ADT > 5000	Unpaved Roads (3)
Average Fleet (4)	0.01 lb/VMT (1)	0.004 lb/VMT	1 lb/VMT
Heavy Duty Trucks	0.4 lb/VMT	0.1 lb/VMT	6 lb/VMT

1. ADT = Average Daily Trips; VMT = Vehicle Miles Traveled.
2. Paved road factors based on calculation procedures in AP-42, Section 13.2.1 (1/96). Paved road entrained dust emission factors calculated assuming using the 50th percentile silt content (AP42, page 13.2.1-5).
3. Unpaved road factors based on calculation procedures in AP-42 Section 13.2.2 (1/95). Unpaved road entrained dust emission factors calculated assuming the mean % silt for rural roads (AP42, page 13.2.2-2).
4. The San Luis Obispo County "average fleet" vehicle composition was determined from the activity model in ARB's MVEI7G model for the 1998 fleet year.

3.2 Roadway and Intersection Emissions

For projects predicted to generate significant levels of traffic or congestion, a CO hotspot analysis may be necessary. CALINE4 is a fourth generation model developed by Caltrans to determine pollutant concentrations near roadways. It is primarily used to predict concentrations of CO near congested roadway segments or intersections; however, it can also be used to calculate ambient levels of NOx, PM10, and other inert gaseous pollutants. Given source, site, and meteorological characteristics, the model can predict impacts on receptors within 150 meters of the roadway. The user needs accurate information about site characteristics, including road widths, number of lanes, traffic control devices, and peak hour traffic loading.

Use of CALINE4 is generally required whenever a project is expected to cause significant queuing of vehicles at an intersection, or is predicted to cause the Level of Service (LOS) on a roadway segment to degrade to LOS D or lower. Table 3-3 lists the District's recommended meteorological inputs to the model.

Table 3-3 CALINE4 Input Values

Wind Speed	0.5 m/s
Stability Class	F
Mixing Height	1,000 feet
Temperature	
Coastal Plain	40 degrees F.
Inland Areas	30 degrees F.

Note: Specific information about traffic patterns in the area of concern (i.e., average vehicle speed, deceleration time, etc.) should be obtained from a traffic engineer. Major projects often require traffic studies for other planning purposes. Input values needed for CALINE4 can be obtained from those studies. Other information sources include Caltrans and the SLO County Public Works. Origin of data and other information used as inputs to the model should be carefully documented in all cases.

3.3 Non-vehicular Emissions from Residential and Commercial Facilities

Non-vehicular emission sources associated with most residential and commercial development include energy use to power lights, appliances, heating and cooling equipment, etc.; evaporative emissions from paints and solvents; fuel combustion by lawnmowers, leaf blowers and other small utility equipment; residential wood burning; household products; and other small sources. Such emissions may appear to be insignificant when viewed individually, but are important from a cumulative standpoint. The URBEMIS model provides air emissions estimations from household products and landscaping based upon various land use types.

3.4 Industrial Emission Sources

From an emissions standpoint, industrial facilities and operations are typically categorized as being point or area sources. Point sources are stationary and generally refer to a site that has one or more emission sources at a facility with an identified location (e.g., power plants, refinery

boilers). Area sources can be stationary or mobile and typically include categories of stationary facilities whose emissions are small individually but may be significant as a group (e.g., gas stations); sources whose emissions emanate from a broad area (e.g., fugitive dust from storage piles and dirt roads, landfills, etc.); and mobile equipment used in industrial operations (e.g., drill rigs, loaders, haul-trucks, etc.). Emissions from new, modified or relocated point sources are directly regulated by the APCD through our New Source Review program (Rule 204) and facility permitting program. A general list of the type of sources affected by these requirements is provided in Appendix A. New development that includes these source types should be forwarded to the District for a determination of APCD permitting and control requirements.

Some stationary and mobile area sources are also subject to District regulation and control (e.g., stationary equipment at mining operations, harbor dredges, and others). However, area sources of fugitive dust (e.g., dirt or sand storage piles), and combustion emissions from mobile equipment at a facility (e.g., loaders, haul trucks, compressors, portable generators, etc.) are not generally subject to direct permitting and control by the District. Thus, impact analysis and mitigation must occur through the CEQA review process. The appropriate emission factors and calculation methods for such sources are contained in the federal Environmental Protection Agency publication, Compilation of Air Pollutant Emission Factors, AP-42 (latest edition).

4 PREPARING THE AIR QUALITY ANALYSIS SECTION FOR ENVIRONMENTAL IMPACT REPORTS

As shown in Table 2-1, use of a simple screening analysis in a Negative Declaration, or emissions calculations and appropriate mitigation measures in a Mitigated Negative Declaration may be all that's necessary for many smaller projects. For larger projects requiring the preparation of an EIR, a more comprehensive air quality analysis is often needed. Such an analysis should address both construction phase and operational phase impacts of the project and include the following information:

a. A description of existing air quality and emissions in the impact area, including the attainment status of the District relative to State air quality standards and any existing regulatory restrictions to development. The most recent CAP should be consulted for applicable information.

b. A thorough emissions analysis should be performed on all relevant emission sources, using emission factors from the EPA document AP-42 "Compilation of Air Pollutant Emission Factors", the latest approved version of EMFAC, or other approved sources. The emissions analysis should include calculations for estimated emissions of all criteria pollutants and toxic substances released from the anticipated land use mix on a quarterly and yearly basis. Documentation of emission factors and all assumptions (i.e. anticipated land uses, average daily trip rate from trip generation studies, etc.) should be provided in an appendix to the DEIR.

c. The DEIR should include a range of alternatives to the proposed project that could effectively minimize air quality impacts, if feasible. A thorough emissions analysis should be conducted for each of the proposed alternatives identified. The DEIR author should contact the District if additional information and guidance is required. All calculations and assumptions used should be fully documented in an appendix to the DEIR.

d. A diesel exhaust screening level health risk assessment should be performed in consultation with APCD engineering staff for projects that will result in significant use of heavy-duty diesel equipment in areas with potential for human exposure, especially when exposures to sensitive receptors are likely. Factors that will be considered by APCD staff when determining if a screening risk analysis will be necessary include the expected emissions from diesel equipment, location of the project and distance to sensitive receptors.

e. A cumulative impact analysis should be performed to evaluate the combined air quality impacts of this project and impacts from existing and proposed future development in the area. This should encompass all planned construction activities within 1 mile of the project.

f. The data analyses requested above should address local and regional impacts with respect to maintaining applicable air quality standards at build out. Authors should consult the District to determine if a modeling analysis should be performed and included in the EIR.

g. The EIR should evaluate the project for consistency with the CAP, as described in Section 2.2 of this document.

h. Temporary construction impacts, such as fugitive dust and combustion emissions from construction and grading activities, should be quantified and mitigation measures proposed. In addition, naturally occurring asbestos may exist at the site. A geological survey is required for the site if it is located in the APCD identified candidate naturally occurring asbestos area. If naturally occurring asbestos is found, the EIR should indicate that a plan will be developed to comply with the requirements listed in the Air Resources Board's Asbestos ATCM for Construction, Grading, Quarrying, and Surface Mining Operations.

i. Mitigation measures should be recommended, as appropriate, following the guidelines presented in Sections 5 and 6 of this document.

5 MITIGATING EMISSIONS FROM DEVELOPMENT

Emissions from motor vehicles that travel to and from residential, commercial, institutional, and some industrial land uses (i.e., indirect sources) can generally be mitigated by reducing vehicle activity through thoughtful site design; implementing transportation demand management (TDM) measures; and/or using clean fuels and vehicles. In addition, area source operational emissions from energy consumption by residential and commercial buildings and activities can be mitigated by increased energy efficiencies, conservation measures and use of alternative energy sources. The mitigation measures in this section are intended to reduce emissions of ROG, NOx, PM10, and CO.

5.1 Site Design-related Mitigation Measures for All Projects

Site design and project layout can be effective methods of mitigating air quality impacts of development. As early as possible in the scoping phase of a project, the District recommends that developers and planners refer to the document *Creating Transportation Choices Through Development Design and Zoning* (Guide) and Appendix E of the District's Clean Air Plan, *Land Use and Circulation Management Strategies*. Strategies provided in these documents suggest ways to reduce automobile-dependence by:

- Building compact communities to limit urban sprawl;
- Mixing complementary land uses, such as commercial services located within and/or adjacent to medium or higher density housing;
  - Develop core commercial areas within 1/4 to 1/2 miles of residential housing areas;
  - Develop residential housing areas within 1/4 mile of transit centers and transit corridors;
- Providing a balance of job opportunities and housing within communities;
- Increasing residential and commercial densities along transit corridors;
- Orienting buildings toward streets with automobile parking in the rear to promote a pedestrian-friendly environment and to provide convenient pedestrian and transit access;
- Providing a pedestrian-friendly and interconnected streetscape to make walking more convenient, comfortable and safe;
- Providing good access for pedestrians, bicyclists, and transit users; and,
- Prioritizing in-fill projects that provide development within the urban core and urban reserve lines.

The energy efficiency of both commercial and residential buildings can be improved by implementing the following measure during project planning and design:

- Orient buildings to maximize natural heating and cooling.

District staff are available to discuss project layout and design factors, which can influence indirect source emissions. The District should be contacted regarding the quantification of emission reductions associated with beneficial site design features.

5.2 TDM-related Mitigation Measures for Commercial, Industrial, and Institutional Projects

Indirect source emissions can be reduced by implementing TDM measures that reduce vehicle travel. Some shorten the length of a trip without eliminating it, resulting in fewer vehicle miles traveled (VMT). However, many TDM-related strategies eliminate an entire vehicle trip and the emissions associated with starting and stopping a car (start-up and hot soak), and are thus more effective in mitigating air quality impacts than those that only reduce running emissions. In addition, TDM strategies are important tools for reducing vehicle congestion and idling, which can reduce localized CO levels.

Demand-management mitigation measures are generally implemented at commercial, industrial, and institutional worksites where the travel patterns of employees on standard work schedules can be modified. While TDM measures can be used to reduce non-work-related travel to indirect sources (e.g., shopping trips to a mall, travel to sporting events), they are more difficult to implement and rarely elicit substantial, quantifiable results. The District should be contacted regarding the quantification of such mitigation measures. The TDM mitigation measures focus on feasible options for reducing commute trips to and from worksites.

5.3 Mitigation measures to increase energy efficiency for residential projects

Domestic and commercial energy use for lighting, heating and cooling is a significant source of direct and indirect air pollution nationwide. Reducing site and building energy demand will reduce emissions at the power plant source and natural gas combustion in homes and commercial buildings.

5.4 Clean vehicle mitigation measures for commercial and industrial projects

Vehicle emissions are often the largest continuing source of emissions from the operational phase of a development. Using cleaner fueled vehicles or retrofitting equipment with emission control devices can reduce the overall emissions without impacting operations. In today's marketplace, clean fuel and vehicle technologies exist for both passenger and heavy-duty applications.

5.5 Off-site mitigations

Occasionally, emissions from large development projects cannot be adequately mitigated with on-site mitigation measures alone. In such cases, it may also be necessary for the developer to implement mitigation strategies outside the project site in order to reduce potential air quality impacts to a level of insignificance. It is important for the developer, lead agency and district to work closely together whenever it is deemed necessary to develop and implement off-site mitigation measures.

5.6 Guidelines for Applying Mitigation Measures

As discussed in Section 2 of this document, the District has developed a tiered system of mitigation recommendations based on the level of emissions generated by project operations. In general, projects not exceeding our Tier 1 threshold of 10 lbs per day ROG, NOx, PM10 or SO2 or 50 lbs per day of CO emissions do not require mitigation. For projects requiring air quality

mitigation, the District has developed a list of both standard and discretionary mitigation strategies tailored to the type of project being proposed (residential, commercial or industrial). The standard mitigation measures should be applied to all projects which exceed our Tier 1 threshold. In addition, varying levels of discretionary mitigation measures may also be necessary, depending on the amount of emissions generated by the project. Discretionary mitigation measures identified in this Handbook or other suitable alternative measures can be suggested to replace standard measures that are not feasible for the project. Project mitigation recommendations should follow the guidelines listed below and summarized in Table 5-1:

a. Projects with the potential to generate 10 lbs/day or more of any individual pollutant emissions should implement all standard mitigation measures listed in Section 5.6.

b. Projects with the potential to generate 10 - 14 lbs/day of any individual pollutant emissions should select and implement at least 3 additional mitigation measures from the discretionary list, as well as the standard measures.

c. Projects generating 15 - 19 lbs./day of any individual pollutant emissions should select and implement at least 6 additional mitigation measures from the discretionary list, as well as the standard measures.

d. Projects generating 20 - 24 lbs./day of any individual pollutant emission should implement at least 10 additional measures from the discretionary list, as well as the standard measures.

e. Projects generating 25 lbs/day or more of any individual pollutant emissions should select and implement all feasible measures from the discretionary list, in addition to the standard measures. Further mitigation measures may also be necessary, including off-site measures, depending on the nature and size of the project.

f. Projects generating 25 tons per year or more of any individual pollutant emissions will need to implement off-site mitigation measures.

Table 5-1 Mitigation Threshold Guide

Emissions	Mitigation Measures Recommended		
	Standard	Discretionary	Off-Site
< 10 lbs/day	None	None	None
10 - 14 lbs/day	All	3	None
15 - 19 lbs/day	All	6	None
20 - 24 lbs/day	All	10	None
≥ 25 lbs/day	All	All Feasible	Maybe
≥ 25 tons/yr	All	All Feasible	Yes

5.7 Standard Mitigation Measures

The recommended standard air quality mitigation measures have been separated according to land use and mitigation type. Any project generating 10 lbs/day or more of emissions should implement all standard measures under the appropriate land use type, while also incorporating the general site-design strategies listed in section 5.1.

5.7.1 Residential Projects

Standard mitigation recommendations for residential projects include the following site design and energy efficiency standards:

Standard Site Design Measures

- Link cul-de-sacs and dead-end streets to encourage pedestrian and bicycle travel;
- Traffic calming modifications to project roads, such as narrower streets, speed platforms, bulb-outs and intersection modifications designed to reduce vehicle speeds, thus encouraging pedestrian and bicycle travel;
- Easements or land dedications for bikeways and pedestrian walkways; and,
- Provide continuous sidewalks separated from the roadway by landscaping and on-street parking. Adequate lighting for sidewalks must be provided, along with crosswalks at intersections.

Standard Energy Efficiency Measures

- Increase the building energy efficiency rating by 10% above what is required by Title 24 requirements. This can be accomplished in a number of ways (increasing attic, wall or floor insulation, etc.).

5.7.2 Commercial and Industrial Projects

Standard mitigation recommendations for commercial and industrial projects include the following site design and energy efficiency standards:

Standard Site Design Measures

- Provide on-site bicycle parking. One bicycle parking space for every 10 car parking spaces is considered appropriate;
- Provide on-site eating, refrigeration and food vending facilities to reduce lunchtime trips.
- Provide preferential carpool and vanpool parking; and,
- Provide shower and locker facilities to encourage employees to bike and/or walk to work, typically one shower and three lockers for every 25 employees.

Standard Energy Efficiency Measures

- Increase building energy efficiency rating by 10% above what is required by Title 24 requirements. This can be accomplished in a number of ways (increasing attic, wall or floor insulation, etc.).

5.8 Discretionary Mitigation Measures

The discretionary mitigation measures listed in this section have been separated according to land use and mitigation type. The measures are presented as a menu of available strategies that can be selected, as appropriate, according to the guidelines shown in Table 5-1. It is important to note that the strategies identified here do not represent a comprehensive list of all mitigation measures possible. Project proponents are encouraged to propose other alternatives that are capable of providing the same level of mitigation.

5.8.1 Residential Projects

Discretionary Site Design Measures

- If the project is located on an established transit route, improve public transit accessibility by providing transit turnouts with direct pedestrian access to project;
- Increased street tree planting.
- Outdoor electrical outlets to encourage the use of electric appliances and tools.
- Secure on-site bicycle parking for multi-family residential developments.
- Increase number of bicycle routes/lanes.
- Build new homes with internal wiring/cabling that allows telecommuting, teleconferencing, and telelearning to occur simultaneously in at least 3 locations in each home.
- Provide pedestrian signalization and signage to improve pedestrian safety

Discretionary Energy Efficiency Measures

- Shade tree planting along southern exposures of buildings to reduce summer cooling needs.
- Use roof material with a solar reflectance value meeting the EPA/DOE Energy Star® rating to reduce summer cooling needs.
- Use high efficiency, gas or solar water heaters.
- Use built-in energy efficient appliances.
- Use double-paned windows.
- Use low energy street lights (i.e. sodium).
- Use energy efficient interior lighting.
- Use low energy traffic signals (i.e. light emitting diode).
- Install door sweeps and weather stripping if more efficient doors and windows are not available.
- Install high efficiency or gas space heating.

5.8.2 Commercial and Industrial Projects

Discretionary Site Design Measures

- Increased street tree planting.
- Shade tree planting in parking lots to reduce evaporative emissions from parked vehicles.
- Install an electrical vehicle charging station with both conductive and inductive charging capabilities.
- Provide on-site banking (ATM) and postal services.
- Provide an on-site child care facility.
- Increase number of bicycle routes/lanes.
- Provide on-site housing for employees.

- If the project is located on an established transit route, improve public transit accessibility by providing transit turnouts with direct pedestrian access to project or improve transit stop amenities
- Implement on-site circulation design elements in parking lots to reduce vehicle queing and improve the pedestrian environment
- Provide pedestrian signalization and signage to improve pedestrian safety

Discretionary Transportation Demand Management Measures
- Employ or appoint an Employee Transportation Coordinator.
- Implement a Transportation Choices Program. The applicant should work with the Transportation Choices Coalition partners for free consulting services on how to start and maintain a program. Contact SLO Regional Rideshare at 541-2277.
- Provide for shuttle/mini bus service.
- Provide incentives to employees to carpool/vanpool, take public transportation, telecommute, walk, bike, etc.
- Implement compressed work schedules.
- Implement telecommuting program.
- Implement a lunchtime shuttle to reduce single occupant vehicle trips.
- Participate in an employee "flash-pass" program, which provides free travel on transit buses.
- Include teleconferencing capabilities, such as web cams or satellite linkage, which will allow employees to attend meetings remotely without requiring them to travel out of the area.
- If the development is a grocery store or large retail facility, provide home delivery service for customers.

Discretionary Energy Efficiency Measures
- Shade tree planting along southern exposures of buildings to reduce summer cooling needs.
- Use roof material with a solar reflectance value meeting the EPA/DOE Energy Star® rating to reduce summer cooling needs.
- Use built-in energy efficient appliances, where applicable.
- Use double-paned windows.
- Use low energy parking lot and street lights (i.e. sodium).
- Use energy efficient interior lighting.
- Use low energy traffic signals (i.e. light emitting diode).
- Install door sweeps and weather stripping if more efficient doors and windows are not available
- Install high efficiency or gas space heating

Discretionary Clean Vehicle Measures
- Replace diesel fleet vehicles with cleaner fueled low emission vehicles (i.e school buses, transit buses, on- and off- road heavy duty vehicles, lighter duty trucks and passenger vehicles)
- Retrofit existing equipment to reduce emissions using methods such as particulate filters, oxidation catalysts, or other approved technologies.

5.9 Off-site Mitigation Measures

Off-site mitigation measures are designed to offset emissions from large projects that cannot be fully mitigated with on-site measures. Off-site emission reductions can result from either stationary or mobile sources, but should relate to the on-site impacts from the project in order to provide proper "nexus" for the air quality mitigation. For example, NOx emissions from increased vehicle trips from a large residential development could be reduced by funding the expansion of existing transit services. The off-site strategies identified below provide a range of options available to mitigate significant emissions impacts from large projects.

- Develop or improve park-and-ride lots.
- Retrofit existing homes in the project area with APCD-approved wood combustion devices.
- Retrofit existing homes in the project area with energy-efficient devices.
- Retrofit existing businesses in the project area with energy-efficient devices.
- Construct satellite worksites.
- Fund a program to buy and scrap older, higher emission passenger and heavy-duty vehicles.
- Replace/repower transit buses.
- Replace/repower heavy-duty diesel school vehicles (i.e. bus, passenger or maintenance vehicles).
- Fund an electric lawn and garden equipment exchange program.
- Retrofit or repower heavy-duty construction equipment, or on-road vehicles.
- Repower marine vessels.
- Repower or contribute to funding clean diesel locomotive main or auxiliary engines.
- Install bicycle racks on transit buses.
- Purchase particulate filters or oxidation catalysts for local school buses, transit buses or construction fleets.
- Install or contribute to funding alternative fueling infrastructure (i.e. fueling stations for CNG, LPG, conductive and inductive electric vehicle charging, etc.).
- Fund expansion of existing transit services.
- Fund public transit bus shelters.
- Subsidize vanpool programs.
- Subsidize transportation alternative incentive programs.
- Contribute to funding of new bike lanes.
- Install bicycle storage facilities.
- Provide assistance in the implementation of projects that are identified in city or county Bicycle Master Plans.

6 EMISSION CALCULATIONS AND MITIGATION FOR CONSTRUCTION IMPACTS

Use of heavy equipment and earth moving operations during project construction can generate fugitive dust and combustion emissions that may have substantial temporary impacts on local air quality. Fugitive dust emissions results from land clearing, demolition, ground excavation, cut and fill operations, and equipment traffic over temporary roads at the construction site. Combustion emissions, such as NOx and diesel particulate matter (diesel PM), are most significant when using large, diesel-fueled scrapers, loaders, dozers, haul trucks, compressors, generators and other heavy equipment. Emissions can vary substantially from day-to-day depending on the level of activity, the specific type of operation and the prevailing weather conditions. Depending on the construction site location and proximity to sensitive receptors, a project that generates high levels of construction emissions, including diesel PM, may require special attention and mitigation, and may need to perform a health risk assessment to evaluate short-term exposures to high pollutant concentrations.

Heavy-duty construction equipment is usually diesel powered. In July 1999, the ARB listed the particulate fraction of diesel exhaust as a toxic air contaminant, identifying both chronic and carcinogenic public health risks. As mentioned earlier in this document, no threshold has been established for diesel PM emissions below which there are no significant effects. Therefore, mitigation requirements and the need for development of a health risk assessment will be determined on a case-by-case basis, based upon emission levels and the potential risk for human exposure and effects. Diesel PM emissions may therefore be a factor in whether Best Available Control Technology for construction equipment (CBACT) will be needed, even when emissions of criteria pollutants are below the APCD significance thresholds.

The following information will assist the user in evaluating the fugitive dust and combustion emissions from a project and in proposing appropriate mitigation measures to reduce these impacts to a level of insignificance.

6.1 Emission Calculations

In calculating emissions for construction operations (NOx, ROG, SO2, CO, diesel PM and fugitive PM), specific information about each activity and phase of the construction project is needed, including the list that follows. All assumptions, estimates, and calculation methods must be provided for District review.

6.1.1 Combustion Emissions from Construction Equipment

- Type and number of each kind of equipment.
- Estimated fuel use and type for each piece of equipment.
- Emission factors for each piece of equipment.
- Total volume of material to be moved.
- Hours of operation per day for each piece of equipment.
- Total number of days of operation for each piece of equipment.
- Estimated number of pieces of equipment to be used simultaneously on the project.
- Duration of each activity (grading, excavation, etc.) for each phase of the project.
- Estimated distance to the nearest off-site occupied building.

6.1.2 Fugitive Dust Emissions

Grading and Excavation

- Determine if naturally occurring asbestos is present (see Section 2.4.d of this Handbook).
- Amount of soil to be disturbed.
- Emission factors for disturbed soil (0.75 tons PM10/acre-month).
- Number of days of grading in a 7-day period.
- Duration of grading activity.

Heavy-Duty Equipment Travel on Unpaved Roads

- Length of road.
- Type of soil.
- Type and number of pieces of equipment.
- Average weight and number of wheels on trucks and other mobile equipment.
- Number of trips and vehicle miles traveled per day for each piece of equipment.
- Duration of activity.

6.1.3 Calculation Methods

Calculation of emissions from construction activities should include peak hour, daily and total construction phase emissions of NOx, ROG, SO2, diesel PM, and fugitive PM. It is important to use the most accurate equipment scenarios possible, including estimates of the number and type of equipment that may be operating simultaneously. The appropriate emission factors for off-highway mobile construction equipment (such as bulldozers, scrapers, etc.) and non-vehicular equipment (such as generators) are contained in the federal Environmental Protection Agency publication, Compilation of Air Pollutant Emission Factors, AP-42 (latest edition). Tables II-7.1 and II-7.2 in volume II of that document list the AP-42 emission factors for construction vehicles. Table 6-1, below, provides a summary of this information.

Table 6-1 Emission Factors for Heavy-Duty Construction Equipment (Lbs/Hour)

EQUIPMENT TYPE	ROG	NOx	CO	SO_2	PM10
Diesel-Powered Equipment					
Track-type Tractor	0.121	1.260	0.346	0.137	0.112
Wheeled Tractor	0.188	1.269	3.590	0.090	0.136
Scraper	0.282	3.840	1.257	0.463	0.406
Motor Grader	0.040	0.713	0.151	0.086	0.061
Wheeled Loader	0.250	1.890	0.572	0.182	0.172
Track-type Loader	0.098	0.827	0.201	0.076	0.058
Off-Highway Truck	0.192	4.166	1.794	0.454	0.256
Roller	0.067	0.862	0.304	0.067	0.050
Miscellaneous	0.152	1.691	0.675	0.143	0.139
Gasoline-Powered Equipment					
Wheeled Tractor	0.362	0.430	9.520	0.016	0.024
Motor Grader	0.410	0.320	12.10	0.017	0.021
Wheeled Loader	0.531	0.518	15.60	0.023	0.030
Roller	0.611	0.362	13.40	0.018	0.026
Miscellaneous	0.560	0.412	17.00	0.023	0.026

Note: Emission factors take into account load factor and equipment rating.

If specific equipment information is not available, it is still possible to calculate an estimate of overall construction emissions. Although each project will vary, an average of 0.27 gallons of diesel fuel is burned for each cubic yard of earth moved. Based on that estimate, the emission rates presented in Table 6-2 below can be used as a screening tool if more refined information is not available.

Table 6-2 Screening Emission Rates for Construction Operations

Pollutant	grams/Yds^3 of Material Moved	Lbs/ Yds^3 of Material Moved
Diesel PM	2.2	0.0049
Carbon Monoxide (CO)	138	0.304
Reactive Organic Gases (ROG)	9.2	0.0203
Oxides of Nitrogen (NOx)	42.4	0.0935
Sulfur Oxides (SOx)	4.6	0.010
Fugitive Dust (PM10)	0.75 tons/acre-month of construction activity (assuming 22 days of operation per month)	

Sources: Bay Area AQMD: Guidelines for Assessing Impacts of Projects and Plans - April 1996, and EPA-AP 42.

6.2 Construction Mitigation Thresholds

Mitigation of construction activities is required when the following emission thresholds are equaled or exceeded by both fugitive and combustion emissions:

6.2.1 ROG or NOx Emissions

- Greater than 185 lbs/day requires Best Available Control Technology for construction equipment (CBACT).
- 2.5 - 6.0 tons/quarter requires CBACT.
- Over 6.0 tons/quarter requires CBACT plus further mitigation, including emission offsets.

6.2.2 PM10 Emissions

- 2.5 tons/quarter requires CBACT

Using emission estimates from Table 6-2 and the mitigation thresholds identified in Table 6-3 shows the approximate level of construction activity that would require mitigation for each pollutant of concern. This District does however have discretion to require mitigation for projects that will not exceed the mitigation thresholds if those projects will result in special circumstances, such as the release of diesel PM emissions near sensitive receptors.

Table 6-3 Level of Construction Activity Requiring Mitigation

Pollutant of Concern	Thresholds (1)		Amount of Material Moved	
	Tons/Qtr	Lbs/Day	Cu. Yds/Qtr	Cu. Yds/Day
ROG	2.5	185	247,000	9,100
	6.0	185	593,000	9,100
NO_x	2.5	185	53,500	2,000
	6.0	185	129,000	2,000
PM10	2.5		Any project with a grading area greater than 4.0 acres of continuously worked area will exceed the 2.5 ton PM10 quarterly threshold. Combustion emissions should also be calculated based upon the amount of cut and fill expected.	

1. Thresholds were approximated using the screening level emission rates from Table 6-2. Daily emission thresholds are based upon the level of daily emissions that may result in a short-term exceedance of the ozone standard.

6.3 ROG, NOx and Diesel PM Combustion Mitigation Measures

The measures described below are designed to mitigate combustion emissions from heavy-duty construction equipment. They should be applied as necessary to reduce construction impacts below the significance thresholds listed in Table 6-3. Best Available Control Technology for construction equipment (CBACT) is required when the construction emission thresholds are

equaled or exceeded. For large construction projects, off-site emission mitigation may also be required.

6.3.1 Construction Equipment Mitigation Measures

A number of construction equipment mitigation measures including, but not limited to, those listed below have been shown to significantly reduce emissions while maintaining overall performance of the modified equipment similar to pre-retrofit levels. It should be noted that the following examples are not considered exclusive. District staff recognize the changing nature of engine and combustion technology and thus do not endorse any single technology for use in all situations. Implementation of a given technology or combination of technologies should always be preceded by an evaluation to determine the most appropriate control strategy. Other control strategies with similar or better emission reduction potential to the following may also be considered if appropriate documentation is provided.

Standard Mitigation Measures for Construction Equipment

- Maintain all construction equipment in proper tune according to manufacturer's specifications.
- Fuel all off-road and portable diesel powered equipment, including but not limited to bulldozers, graders, cranes, loaders, scrapers, backhoes, generator sets, compressors, auxiliary power units, with ARB certified motor vehicle diesel fuel (non-taxed version suitable for use off-road).
- Maximize to the extent feasible, the use of diesel construction equipment meeting the ARB's 1996 or newer certification standard for off-road heavy-duty diesel engines.

CBACT

- Install diesel oxidation catalysts (DOC), catalyzed diesel particulate filters (CDPF) or other District approved emission reduction retrofit devices.

The ARB has recently verified DOC and CDPF systems for HD diesel vehicles. DOCs have control efficiencies on the order of 25% while CDPFs can achieve diesel PM reductions of 85% or better. In general, DOCs are effective at reducing the fine particle component while CDPFs are effective at reducing both the fine particle and larger black soot components. Manufacturer data indicates that both types of devices can reduce about 90% of CO emissions and about 50 to 70% of ROG emissions, some of which being a portion of the diesel PM component. Some devices/systems are being developed that have the added benefit of being able to reduce NOx emissions.

Determination of the appropriate CBACT control device(s) for the project must be performed in consultation with APCD staff.

Discretionary Mitigation Measures for Construction Equipment

- Electrify equipment where feasible.
- Substitute gasoline-powered for diesel-powered equipment, where feasible.
- Use alternatively fueled construction equipment on site where feasible, such as compressed natural gas (CNG), liquefied natural gas (LNG), propane, or biodiesel.
- Use equipment that has Caterpillar pre-chamber diesel engines.

- Implement activity management techniques as described in Section 6.4.

6.4 Activity Management Techniques

a. Develop of a comprehensive construction activity management plan designed to minimize the amount of large construction equipment operating during any given time period.

b. Schedule of construction truck trips during non-peak hours to reduce peak hour emissions.

c. Limit the length of the construction work-day period, if necessary.

d. Phase construction activities, if appropriate.

6.5 Fugitive PM10 Mitigation Measures

The following mitigation measures are required for all projects which exceed the mitigation thresholds identified above. Proper implementation of these measures will achieve a significant reduction in fugitive dust emissions.

a. Reduce the amount of the disturbed area where possible.

b. Use of water trucks or sprinkler systems in sufficient quantities to prevent airborne dust from leaving the site. Increased watering frequency would be required whenever wind speeds exceed 15 mph. Reclaimed (nonpotable) water should be used whenever possible.

c. All dirt stock-pile areas should be sprayed daily as needed.

d. Permanent dust control measures identified in the approved project revegetation and landscape plans should be implemented as soon as possible following completion of any soil disturbing activities.

e. Exposed ground areas that are planned to be reworked at dates greater than one month after initial grading should be sown with a fast-germinating native grass seed and watered until vegetation is established.

f. All disturbed soil areas not subject to revegetation should be stabilized using approved chemical soil binders, jute netting, or other methods approved in advance by the APCD.

g. All roadways, driveways, sidewalks, etc. to be paved should be completed as soon as possible. In addition, building pads should be laid as soon as possible after grading unless seeding or soil binders are used.

h. Vehicle speed for all construction vehicles shall not exceed 15 mph on any unpaved surface at the construction site.

i. All trucks hauling dirt, sand, soil, or other loose materials are to be covered or should maintain at least two feet of freeboard (minimum vertical distance between top of load and top of trailer) in accordance with CVC Section 23114.

j. Install wheel washers where vehicles enter and exit unpaved roads onto streets, or wash off trucks and equipment leaving the site.

k. Sweep streets at the end of each day if visible soil material is carried onto adjacent paved roads. Water sweepers with reclaimed water should be used where feasible.

All PM10 mitigation measures required must be included on grading and building plans. In addition, the contractor or builder should designate a person or persons to monitor the dust control program and to order increased watering, as necessary, to prevent transport of dust off site. Their duties shall include holidays and weekend periods when work may not be in progress. The name and telephone number of such persons shall be provided to the APCD prior to land use clearance for map recordation and land use clearance for finish grading of the structure.

7 MITIGATION MONITORING AND REPORTING

7.1 Mitigation Monitoring and Reporting associated with Environmental Impact Reports

In order to ensure that the mitigation measures and project revisions identified in the EIR or mitigated negative declaration are implemented, the public agency shall adopt a program for monitoring or reporting on the required project revisions and the measures imposed to mitigate or avoid significant environmental effects.

The District requests that copies of mitigation monitoring and reporting programs be forwarded to the APCD following completion of the project review process.